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ABSTRACT

This study followed a small group of children exposed to pre- and perinatal health threats to determine whether any psychological effects of the health threat could be identified and if so, whether there is potential in pediatric care to prevent such consequences. The 67 infants were all members of low income families. The tests used included the Parental Attitudes Research Instrument (PARI) and maternal interval histories (about financial stress, housing difficulties and illnesses) taken every four months. Interval histories on the children's behavior were taken when the children were 18 months old. The findings indicate that maternal concern about health or outcome increases the likelihood of deviant behavior in children with histories of threat. These concerned mothers can be identified at the point of stress for intervention due to their fears of loss or defect in their children. Though environmental stresses do not increase the incidence of deviations, they may obscure for the physician the effect of maternal concern about a health threat. Intensive social work services in collaboration with the medical care is required if an intervention program is to reach vulnerable mother-infant pairs. [Not available in hard copy due to marginal legibility of original document.] (Author/AJ)

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THE PSYCHOLOGICAL EFFECTS OF PREGNANCY AND NEONATAL HEALTH THREATS ON CHILD DEVELOPMENT

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In the early 1960's Rone[1] reported that certain pregnancy or newborn complications may indirectly affect child development by their psychological impact on maternal behavior. He described several cases of disturbed children with histories of pre- or perinatal complications in which the difficulty had had an unfavorable influence on the mother's perception of her child's viability. Her distorted perception influenced her behavior and in turn became a factor in the child's deviant outcome. A somewhat similar mechanism was described by Green and Solnit[2] to explain the emotional disorders seen in children who at an earlier age had been expected to die. They termed this situation a "vulnerable child syndrome."

In theory the childhood disturbances and the pathological mother-child interaction described by these authors might be prevented. If vulnerability were readily located, then appropriate

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remedial programs could be designed. In practice, however, several questions must be answered before realistic public health measures can be applied. This is especially true in that population where the incidence of health threats is highest; namely, the socially and economically disadvantaged.[3] In such a group, where so many adverse factors are operating to influence development, can one identify the effect of a health threat? If so, is there potential in pediatric care to prevent the psychological consequences of health threats in subjects living under these conditions?

To examine some aspects of these questions the authors began, in 1964, a prospective study of a sample of sixty-seven mother-infant pairs from a highly stressed population. All were exposed to certain pregnancy or newborn difficulties that might cause maternal concern but were of no consequence medically as far as the child's viability or future mental functioning was concerned. Those carrying a high risk of neurological damage to the infant were eliminated.[4] The study was designed to observe the children's development; attempt to locate the most vulnerable pairs by examining certain maternal psychological factors presumed to influence vulnerability; observe the mother-child interaction

for early signs of disturbance presumably related to the birth difficulty and examine the potential of pediatric care in the prevention of any psychological effects observed.

SUBJECTS:

The sample consisted of sixty-seven mother-infant pairs from the prenatal clinic and newborn service at Pennsylvania Hospital. All of the patients were part of a large research population being followed in the NINDS Collaborative Research Project. Thirty-five of the mothers were selected prenatally for the following reasons: pre-eclampsia; conditions involving special risk to the infant (rising Rh antibody titre, bleeding and incompetent os); kidney infections; previous pregnancies having terminated in the death of the fetus and non-pregnancy related chronic illnesses (diabetes, cardiac disease, carcinoma-in-situ and sarcoidosis).

Thirty-two of the mothers were selected postnatally for the following conditions in the infants: prematurity (1,800 to 2,500 grams); correctable congenital anomalies (hypospadias, inguinal hernia, imperforate anus, Erb's palsy and pigmented nevus); exchange transfusions for blood group incompatibility; infection

requiring hospitalization and placement in a special nursery for observation because of such labor complications as elevated maternal temperature, unattended or unsterile delivery and repeat Caesarean sections.

Background Characteristics

Examination of the group showed that there was similarity among the subjects for factors other than the health threat.

The mothers enrolled in the project were predominantly from urban slums; sixty-three were Negro, three were white and one was Puerto Rican. Most lived in conditions of poverty. Eighty-two percent were at poverty level income or below ($4,000 per year for a family of four). Twenty-seven percent were on Public Assistance ($2,388 per year for a family of four). Poor housing and substandard living conditions were the rule. Only nine owned their homes at intake. Of the fifty-eight renting thirteen lived in Public Housing. Thirty of the fifty-eight families moved at least once and four moved three or more times in the eighteen month period.

Educational attainment for the group was low (at the mean

for Philadelphia).[5] Only sixteen (24%) were high school graduates. Seventy-six percent had not completed secondary school.

Inexperience was not a factor in the child rearing behavior of the mothers as all had at least one older child. The average number of siblings per family was three, the sibships ranged in size from one to nine. The average age of the mothers was 26.5 with a range from sixteen to forty-six. Forty-three percent of the mothers worked at least part time during the eighteen months. Child care was frequently delegated to multiple caretakers and the arrangements were usually informal.

There was a high incidence of social disorganization among the families. Twenty-one (31%) of the children were illegitimate, almost twice the average for Philadelphia.[5] Eighteen (27%) of the fathers were not present in the home or the community during the follow up.

Contacts with social, law enforcement and protective agencies were high. Thirty-seven or 55% were registered on the social service registry. Of those registered fourteen or 38% had three or more registrations ranging from one to thirteen per family. In thirty or 81% there were two generations registered.

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DATA AND METHODS:

a) Mothers

The mothers were enrolled in the program either during their pregnancy or following the birth of their infant. The following data were obtained in an initial interview: The mother's concern about the threat for which chosen; her affiliation with the child, her fears about his viability or development, current stress and past self-esteem.

The data obtained in the initial history were rated independently by the investigators, categorized and scales constructed for major variables.

Special interviews were conducted in the infant's second year of life to obtain descriptions of maternal caretaking behavior. These descriptions were rated under the following categories: Support of autonomy, control, closeness and hostility. These dimensions of maternal behavior were adapted from the Parental Attitudes Research Instrument (PARI).[6] The subjects were ranked and those with extremes of behavior in each category identified.

NIMDB interval histories were used for ratings of intercurrent stress. These histories were obtained from the mothers every

four months during the follow up period and recorded information about financial stress, housing difficulties and illnesses.

In order to increase the study team's opportunity to observe maternal reactions to the health threats and to study the amount and kind of care needed for primary prevention, a "study" group of about one-half of the sample was selected. This group was provided continuity of pediatric care with a social worker and a child psychiatrist available for consultation to the pediatrician. Social work was included as part of the routine care offered because we had anticipated sample maintenance problems. The remainder of the subjects were examined for outcome only. They were not followed clinically to guard against the possibility that frequent contact with the study team might influence maternal caretaking behavior.

b) Children

Behavioral development at age eighteen months was determined by using NINDB interval histories. These histories were obtained in the home by specially trained NINDB historians who interviewed the principle caretaker and obtained descriptions of the infants' behavior in self-care, social interaction, play, speech and

neuro-muscular development. These descriptions were rated by the authors and the following categories of deviant behavior identified: (1) pica, (2) phobic response, (3) temper tantrums, (4) excessive non-nutritive sucking, (5) sleep disturbance, (6) stereotyped behavior, (7) failure to develop self care, (8) delayed speech, (9) maladaptive response, (10) delayed motor development, and (11) chronic constipation.

The children with no deviations and those with multiple deviations (three or more) were identified for comparison.

The Final Sample:

Infants with the following conditions were eliminated from the sample when analyzing outcome because they were considered to be at risk for neurological damage: Birthweight below 1,800 grams; an Apgar rating below seven at five minutes of age; an abnormal neurological examination at birth; an abnormal psychological examination at eight months or an abnormal neurological examination at twelve months. Three infants had one or more of these criteria. Further attrition was as follows: Two infants died, one moved out of the area and one could not be located for the final interview. This reduced the final sample to sixty on whom developmental outcome was obtained.

RESULTS:

A. Behavioral deviations at eighteen months (n = 60).

In the final sample thirteen (22%) children had no deviations and forty-seven (78%) had one or more. Of the latter group sixteen children (27%) had multiple deviations, i.e., three or more. For the incidence of individual items, see Table 1.

B. Relationship of maternal factors to behavioral deviations.

Five of the original sixty-seven mothers were rated as "non-affiliated or rejecting" of their infants. In our analysis we treated these as a separate group because we felt that their rejection would be an over-riding determinant of their infant's outcome. As it turned out two of their infants were later reported as accidental deaths.

Maternal Concern:

Of the remaining sixty-two mothers rated as "affiliated," twenty-five expressed concern about the threat for which chosen and feared death or future defect in their infants. When we examined the behavior of children of these mothers, there was a significant difference ($p < 0.02$ with Fisher Exact Test) in deviancy rates of their children as compared to the children of

mothers who were without these concerns. See Table 2. The concerned mothers were also more apt to have children with multiple deviations (three or more). ($p \leq 0.05$) See Table 3. We inspected the concerned and the unconcerned mothers for differences in caretaking behavior. The concerned mothers tended to be high in controlling behavior (Figure A), closeness (Figure B), and hostility (Figure C). The concerned mothers also tended to be high in control and hostility when these two behaviors were combined (Figure D). These groups were not large enough for statistical computations. See Table 4.

The distribution of concerned and unconcerned mothers in the various categories of threat is shown in Table 5. It is of interest that the prenatal category "Loss of a previous child", and the postnatal category "Infection requiring hospitalization" contained a high number of concerned mothers and no unconcerned mothers.

Maternal Self-Esteem:

As seen in Table 6, those mothers rated as high in self-esteem in past social relationships were more apt to have children without deviations ($p \leq 0.025$).

Maternal Life Stress:

Deviancy was not related to the degree of distress the mother was experiencing in her marriage, with her other children and in other aspects of her life (housing, finances, work, neighborhood and goal conflicts).

C. Relationship of fetal factors to behavioral deviation.

Behavioral deviation was not significantly related to the sex of the infant, nor was it related to the timing of the health threat: i.e., pre- or postnatal.

DISCUSSION:

The findings of our study support the conclusions of Rose[1,7] and of Green and Solnit[2] that health- or life-threatening conditions involving infants may unfavorably influence their mother's perception and behavior and become an important factor in the offspring's development. Rose reported a high percentage of children with lack of aggressive, adventuresome and exploratory behavior in a follow up study of four year olds who had had successful exchange transfusions at birth. The mothers of these children reported distortions in their perceptions of the child's viability which had begun when their children were transfused in

infancy. The effect of the mother's distortion on her behavior, he concluded, became an unfavorable influence in the child's environmental experience and adversely affected its development.

Green and Solnit described a group of young children who had severe illnesses from which they were expected to die and who later showed behavioral deviations following complete recovery from the death-threatening illness. The presenting symptoms in these children included separation difficulty, infantilization, bodily-overconcerns and school underachievement. The investigators postulated that the effect of the fatal prognosis on the parent-child relationship was the causal factor in producing the deviant behaviors observed.

These were retrospective studies and a question which inevitably arises is "What protects some of the children?" "Are there differences in vulnerability within the children themselves?" This may indeed be so but we found when we selected cases at the point of stress that there were differences in the level of maternal concern and that those with more concern -- had children with significantly more deviations than the unconcerned. Moreover this more concerned group of mothers

tended to be higher in controlling behavior and closeness. These are the characteristics which have been classically associated with maternal over-protection.[8] In view of Levy's speculation as to unconscious rejection in his "over-protective" mothers, it was of interest that our more concerned group tended to be high in overt hostile behavior toward their children, i.e., more spanking, slapping and punishing.

These findings have major implications for prevention since it would then seem possible to locate in advance the mothers whose infants are most at risk for the development of deviations in the first two years. We cannot be sure that this is the same group whose children would show problems in aggressiveness at a later age but the associated maternal behavior suggested that this would be so.

The children in our study were all considered "sound" from a medical point of view. Even those with congenital defects had had these corrected by eight months and the Erb's palsy cleared by six months. It then did not appear that the mothers could be reacting to actual defect or malfunction but to a continuing perception of defect or a continuing fear of loss of the child.

The following example is a vivid illustration of how one mother's perception and caretaking was influenced by the loss of a previous child.

At the first pediatric follow up, the mother complained about the child's poor sleeping habits. Two weeks later she called for an appointment complaining that things with the baby were terrible, she had not slept for three days, was spitting up and was screaming most of the time. In addition the mother was concerned about fussiness, constipation, jumpiness and that the "baby that died threw up a lot too." As she gave the history to the physician, it was noted that she would constantly move the child in her lap whenever it tried to doze. A careful history revealed that she was unable to stay away from the child when it was napping during the day or sleeping too soundly at night. She would go to the crib and awaken the baby to make sure it was living. The pediatrician empathized with the mother, acknowledging that he could understand her concern because of her previous experience. However, he stressed that this baby was healthy and developing normally and that the current symptoms were probably from over-stimulation related to her need to reassure herself by constantly holding and checking on the baby. In subsequent visits the mother reported that the baby was sleeping and eating better and that she was less fearful.

It would be overly simplistic to assume that maternal concern was the only factor influencing outcome. As a result of the interviews conducted at intake, we were aware that our population was subject to many reality stresses other than the threat to their infants. Financial and other reality problems were frequent and we examined them for their effect on the development of symptoms in the children. However, these stresses did not prove to increase frequency of deviation. The factors which showed significant correlation with outcome in the child were those which rated maternal self-esteem at various points in the mother's development. It seemed, then, that we must conclude that self-perception of the mother acquired through her experiences in interpersonal relationships was more important than current reality stresses to that highly complex interpersonal relationship between mother and infant.

Although reality factors did not increase the frequency of developmental deviations in the children, they did influence the mother's participation. Where there were no beds for the children, no gas to cook with, no money to buy food, neither the mothers nor ourselves could focus on the infant and his development. Although we were aware that we were selecting a low socioeconomic group, we were unprepared for the impact that the high level of

need and disorganization in some of the cases was to have on our ability to observe the psychological effects of the health threat and on our own morale.[9,10]

We had planned that the social worker would function on behalf of sample maintenance; arranging transportation, baby-sitting or hospitalization when necessary but we found that we were dealing, in some instances, not with people who needed money to get to the pediatrician for well baby care, but money so that the gas could be turned back on or so that the family could eat tomorrow.

The following case illustrates how reality factors influenced one mother's use of pediatric care.

The B.'s had produced, in their eleven years of marriage, seven children ranging in age from nine to one and a half.

In our first interview, we learned that, during the fifth month of her current pregnancy, the family's creditors relieved the family of everything but the clothes on their backs. The children were boarded with a sick maternal grandmother while

the couple lived in a small room.

Shortly after delivery, the couple was able to rent a house by misrepresenting the number of children they had. On the social worker's first home visit she found the house to be immaculate but empty save for one bed, a few pots and a cheap living room set. Mrs. B.'s immediate goal was to bring the other children home but the minimum requirements for this were a refrigerator, two bunk beds, a crib and $62.00 to satisfy an old bill before the gas could be turned on.

By utilizing all available community resources the social worker secured the above necessities and the children came home.

The family continued to have one problem after another -- mounting bills, illness in one or another of the family members, lack of adequate clothing for school attendance, etc. Though Mr. B. was working overtime whenever possible his inability to meet the daily expenses of a family of ten took its toll. Marital problems developed and Mrs. B. was afraid that he might "walk away" as her father had.

Considerable energy and time was directed to this family, such as arranging transportation, providing all the concrete assistance possible, providing supportive and counseling contacts, reorganizing examination schedules to meet Mrs. B.'s convenience and numerous home visits. Despite this Mrs. B. was unable to organize her life sufficiently to participate in pediatric care, studies and observations required by the project.

This case was not "typical", but we found ourselves acting as though it were. In order to maintain perspective, it was necessary to insist on a periodic review of all cases for their positive as well as negative factors,[9,10] so that we did not lose sight of the fact that many families were showing evidence of being able to organize and make use of the assistance offered.

A very sobering finding of our study and one that offers another possibility for intervention is indicated by the outcome of the children of the five mothers that we classed as "rejecting". The infants of two of these mothers met accidental deaths before their second birthday. One of these mothers had desperately wanted day care for her infant but despite an all out effort, day care was not obtainable for an infant less than a year of age.

We would suggest that if one can identify mothers with strong and unchanging needs to be rid of their infants, and if the community will provide resources, it might be possible to prevent rather than treat some of the entries in the increasingly lengthy Register of Battered Children.

SUMMARY AND CONCLUSIONS:

This study followed a small group of ~~socially~~ deprived children exposed to pre- and perinatal health threats to determine whether any psychological effects of the health threat could be identified and, ~~if so,~~ whether there is potential in pediatric care to prevent such consequences. The findings indicate that maternal concern about health or outcome increases the likelihood of deviant behavior in children with histories of threat. These concerned mothers can be identified at the point of stress for intervention, geared to their fears of loss or defect in their child. Though environmental stressors do not increase the incidence of deviations they may obscure for the physician the effect of maternal concern about a health threat. Intensive social work services in collaboration with the medical care is required if an intervention program is to reach vulnerable mother-infant pairs.

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TABLE I

INCIDENCE OF INDIVIDUAL BEHAVIORAL DEVIATIONS AT 18 MONTHS

Item	Number
Pica	19
Phobic Response	19
Temper Tantrums	18
Excessive Non-nutritive Sucking	14
Sleep Disturbance	12
Stereotyped Behavior	7
Failure to Develop Self Care	6
Delayed Speech	5
Maladaptive Response	3
Delayed Motor Development	2
Chronic Constipation	1
Total Deviations (47 children)*	106

* 13 children had no deviations.

TABLE 2

BEHAVIORAL DEVIATIONS AT 18 MONTHS

	0	1 or More*
Concerned	1	22
Not Concerned	5	7

* $p < 0.02$

TABLE 3

BEHAVIORAL DEVIATIONS AT 18 MONTHS

	0	3 or More*
Concerned	1	8
Not Concerned	5	3

* $p = 0.05$

TABLE 4

MATERNAL CARETAKING CHARACTERISTICS

Caretaking Characteristic		Concerned (N=22)		Not Concerned (N=11)	
		N	%	N	%
Control	High	7	32	2	18
	Low	4	17	5	45
Hostility	High	7	32	2	18
	Low	6	27	3	27
Closeness	High	7	32	2	18
	Low	6	27	6	54
Control - Hostility	High	5	23	0	0
	Low	2	9	3	27
Control - Closeness	High	2	9	1	9
	Low	2	9	3	27

TABLE 5

DISTRIBUTION OF CONCERNED AND UNCONCERNED MOTHERS AS TO TYPE OF THREAT (N=38)

	CONCERNED (N=25)	UNCONCERNED (N=13)
PRENATAL		
Pre-eclampsia	1	2
Special Risk - Infant	4	2
Kidney Infection	2	1
Loss of Previous Child	4	0
Special Risk - Maternal	2	1
Total	13	6
POSTNATAL		
Prematurity	1	0
Correctable Congenital Anomaly	2	2
Exchange Transfusion	3	2
Separation for Observation	2	3
Infection Requiring Hospitalization	4	0
Total	12	7

TABLE 6

SELF-ESTEEM vs DEVIATIONS

	Deviations	
	0	3 or More*
Low Self-esteem	3	9
High Self-esteem	8	2

* $p \overset{m}{=} 0.025$

FIGURE A

MATERNAL CARETAKING CHARACTERISTICS

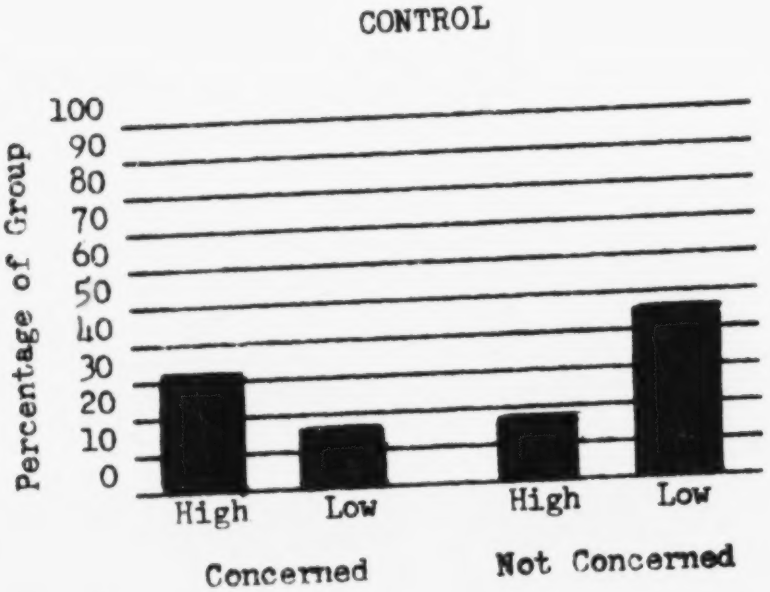

FIGURE B

MATERNAL CARETAKING CHARACTERISTICS

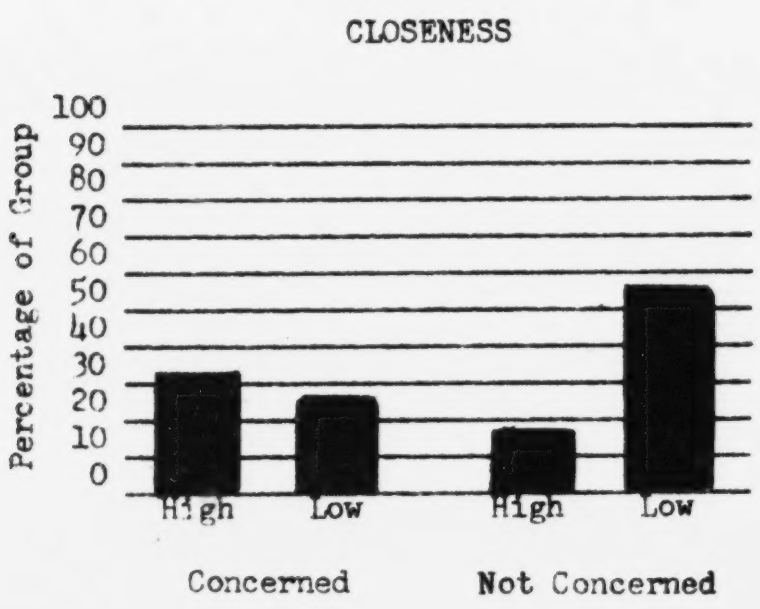

FIGURE C

MATERNAL CARETAKING CHARACTERISTICS

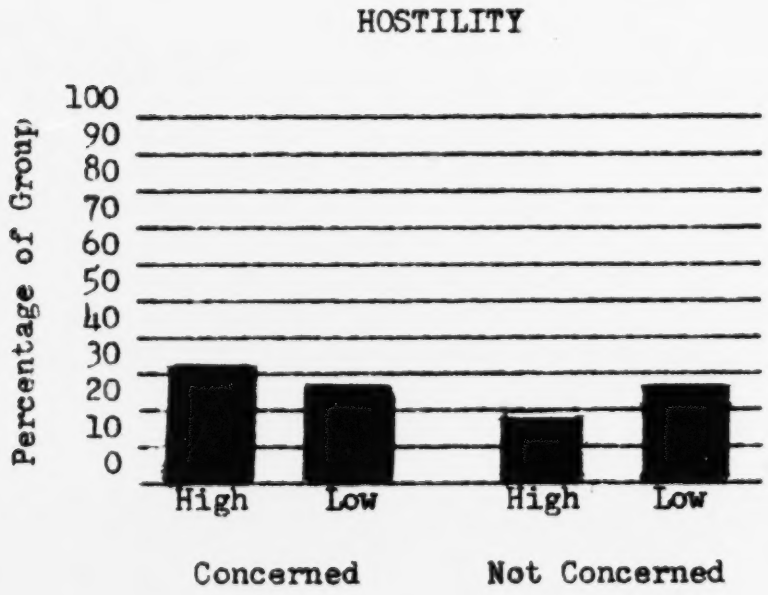

FIGURE D

MATERNAL CARETAKING CHARACTERISTICS

CONTROL-HOSTILITY